Methylmercury Entry into the Food Web of the Hells Canyon Reservoir Complex

Collin Eagles-Smith
Supervisory Research Ecologist

US Geological Survey
3200 SW Jefferson Way
Corvallis, OR
Telephone: 541-750-0949
Email: ceagles-smith@usgs.gov

Mercury is a pervasive environmental contaminant that biomagnifies through food webs and is responsible for more than 80% of fish consumption advisories in the U.S. There are several mercury-related advisories within Idaho, including the Hells Canyon Complex (HCC) reservoirs along the Snake River. As part of a multidisciplinary effort to understand the drivers of mercury cycling and biomagnification within the HCC we examined temporal and spatial patterns of methylmercury concentrations at the base of the food web (zooplankton and benthic invertebrates), as well as within the fish community.

Preliminary results indicate that methylmercury concentrations in zooplankton exceeded those of benthic invertebrates but there was strong temporal variability in zooplankton methylmercury concentrations. Concentrations were lowest in early spring (March/April) and midsummer (July/August), and highest in late spring (May/June) and late summer/early fall (September/October). Although relative changes over time in zooplankton methylmercury concentrations were consistent throughout the HCC, there was substantial site-to-site variation during any given sampling event, and concentrations varied by up to 3-fold across sites. Sites that were strongly stratified with substantial hypolimnetic development had higher zooplankton methylmercury concentrations than unstratified sites, thus we evaluated zooplankton methylmercury concentrations within discrete depth strata. Zooplankton methylmercury concentrations were substantially higher at depths that were near the thermocline than those from the upper epilimnion. However, diel sampling suggested that vertical zooplankton migration may be transporting methylmercury from lower depths to the upper epilimnion, increasing potential exposure to fish and other higher order consumers.

Mercury concentrations in smallmouth bass increased with fish size, and also showed substantial spatial variation. Size-normalized smallmouth bass mercury concentrations increased linearly from the lowest concentrations at upstream extent of the HCC to the highest concentrations at Hells Canyon Dam (the most downstream sampling location), then decreased substantially immediately below the dam. Our preliminary results suggest that seasonally dynamic processes influence methylmercury cycling through the HCC food web.